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Manfred Roessler

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EXAMINER

MCGRAW, TREVOR EDWIN

ART UNIT

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3752

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/531,407	<b>Applicant(s)</b> ROESSLER ET AL.	
	<b>Examiner</b> Trevor E. McGraw	<b>Art Unit</b> 3752	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 01 December 2009.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 7 and 13-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 7 and 13-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)                        | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Examiner's Comment***

Examiner acknowledges the addition of new claims 15-18.

### ***Election/Restrictions***

Newly submitted claims 15-18 directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: Claims 15-18 are directed to a method of coating an armature stop face which were not previously examined nor presented. Examiner notes that apparatus claims were the original set of claims and are hereby examined as such.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 15-18 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 7, 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gray (US 4,245,789) in view of Maier et al. (US 5,732,888) and Denton et al (US 5,226,975) further in view of McCane et al (US 6,592,947).

In regard to Claim 7, Gray teaches a fuel injector with a solenoid assembly (14), an armature (73) acted upon by a spring (77) in the closing direction, a valve needle (72) that is connected to the armature (73) by force locking where a valve closure member (Figure 1) is formed which forms a sealing seat with a valve needle surface (Figure 1) where the armature stop face (73s) strikes against a stop face (63s) of an inner pole (63) where the surface structure of the armature stop face (73s) and the stop face of the inner pole (63s) have raised and recessed dome shaped areas (Figure 2) at a height difference of 0.4  $\mu\text{m}$  to 0.8  $\mu\text{m}$  for the inner pole stop face (63s) and 0.2  $\mu\text{m}$  to 0.3  $\mu\text{m}$  for the armature stop face (73s). It is noted to Applicant that the rough surfaces of Gray are utilized to prevent hydraulic lock.

Although Gray substantially teaches the present invention it fails to teach where an armature stop face (73s) and inner pole piece being coated with a plurality of chromium layers where the height difference between the raised and recessed dome shaped areas are in a height difference between 5  $\mu\text{m}$  to 10  $\mu\text{m}$  and is reduced to between 4  $\mu\text{m}$  and 5  $\mu\text{m}$  during use of the fuel injector.

However, Maier et al teach having a chromium coating used with on an armature stop face and on a stop face of an inner pole where the coating is the same on the

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armature and inner pole stop faces to provide a wear resistance medium for an armature (see column 6, lines 1-11).

Therefore, it would have been obvious to one with ordinary skill in the art at the time of the present invention was made to apply the chromium coating as taught by Maier et al to the armature stop face and inner pole piece taught by Gray to provide for a higher resistant coating to preclude or reduce operational wear per cycle of the fuel injector. The application of the coating of Maier et al onto the dome shaped rough surface of Gray would also permit improved prevention hydraulic sticking of the armature and pole piece stop face due to the thicker raised and recessed areas of the armature and pole piece surfaces of Gray (the height of the raised and recessed areas of Gray would increase to 10  $\mu\text{m}$  as a result of the Maier et al coating; see Maier et al column 4, lines 11-12).

The combined device of Gray in view of Maier et al as described above substantially teach the present invention with the exception of the chromium coating being in a plurality of layers.

Conversely, Denton et al teach depositing a chromium coating in a plurality of layers (see column 2, lines 57-65) onto a surface.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the present invention was made to have applied the chromium layer of Gray in view of Maier et al in a plurality of layers as taught by Denton et al in order to permit for optimal dimensional extended wear integrity of fuel injector components.

The device of Gray in view of Maier et al and further in view of Denton et al when combined teach where a surface structure of the coating has raised areas and recessed areas and where the raised areas have a dome-shaped design with the height difference between the raised areas and recessed areas initially being between 5  $\mu\text{m}$  and 10  $\mu\text{m}$  as a result of applying the plurality of chromium layers (see Denton et al column 2, lines 57-65) on the raised and recessed areas (see where surface of Gray has raised and recessed areas; see Gray column 8, lines 42-62) on the armature stop face and inner pole stop face (see Maier et al column 6, lines 1-11) of Gray due to Maier et al teaching a thickness of 10  $\mu\text{m}$  (see Maier et al column 4, lines 11-12).

However, the combined device of Gray in view of Maier et al and further in view of Denton et al fail to teach where there is a height difference between 5  $\mu\text{m}$  to 10  $\mu\text{m}$  and is reduced to between 4  $\mu\text{m}$  and 5  $\mu\text{m}$  during use of the fuel injector.

On the other hand, McCane et al teach having a coating that has a height difference between 5 and 10  $\mu\text{m}$  of raised and recessed areas. It is noted that McCane et al teaches having a coating that is applied to a roughed surface (5 to 50  $\mu\text{m}$  deep) where the coating is applied in the range of 10 to 100  $\mu\text{m}$ . Therefore, as evidenced by Figure 1 of McCane et al, the height difference between the raised and recessed areas of the coating taught by McCane et al is between 5 to 10  $\mu\text{m}$  and is therefore obvious to one having ordinary skill in the art at the time the present invention was made in order to provide for a manner in which to increase corrosion resistance to a metal.

The device of Gray in view of Maier et al and Denton et al and further in view of McCane et al when combined would inherently reduce the levels of the dome shaped

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chromium layers on the armature and inner pole stop face to between 4  $\mu\text{m}$  and 5  $\mu\text{m}$  as a result of wear due to multiple impacts between the armature and inner pole stop faces (see Maier et al column 4, lines 27-30) and having a thick coating would prolong the life of the armature and pole piece stop faces.

In regard to Claim 13, the combined device of Gray in view of Maier et al and Denton et al and further in view of McCane et al teach where the coating is applied onto a substantially flat surface of the armature, thereby providing the raised areas and recessed areas (Examiner notes that the term "substantially" is being given it's broadest interpretation and that in as much as Applicant's surface is "substantially flat so is the armature surface of the device taught by Gray in view of Maier et al and Denton et al.).

In regard to Claim 14, the combined device of Gray in view of Maier et al and Denton et al and further in view of McCane et al teach where the raised areas are formed by depositing a greater thickness of chromium in the raised areas compared to the recessed areas (Examiner notes that this is accomplished when the coating is applied to the armature surface of Gray where the raised areas of Gray already have a greater thickness than the recessed areas).

### ***Response to Arguments***

#### **Rejection under 35 USC § 103**

Applicant's arguments filed 12/01/2009 have been fully considered but they are not persuasive. Examiner cannot agree with Applicant's assertion that the difference in

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height levels will not be between 5 and 10  $\mu\text{m}$ . The applied chromium coating as required by the combined device of Gray in view of Maier et al and Denton et al would make up for the difference to account for the 5 to 10  $\mu\text{m}$  height difference between the raised and recessed areas. The combination also shows that an armature face can be coated with a chromium layer and that chromium can be applied in multiple layers where these multiple layers can be applied on the armature stop face of Gray.

Applicant is again reminded that Claim 7 is a product by process Claim. It has been held that the patentability of a product does not depend on its method of production (e.g. the deposition of chromium layers having raised and recessed areas, etc.). Examiner notes that if the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process (See MPEP 2113).

However, Examiner withdraws the rejection and notes that Applicant's arguments are moot in view of grounds of new rejection as mentioned above.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Trevor E. McGraw whose telephone number is (571) 272-7375. The examiner can normally be reached on Monday-Friday (2nd & 4th Friday Off).



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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Len Tran can be reached on (571) 272-1184. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/T. E. M./  
Examiner, Art Unit 3752  
/Len Tran/  
Supervisory Patent Examiner, Art Unit 3752

03/27/2010